IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

PARKERVISION, INC,	§	
Plaintiff	§	
	§	**6:21-CV-00520-ADA**
v.	§	
	§	
LG ELECTRONICS, INC.,	§	**JURY TRIAL DEMANDED**
Defendant	§	
	§	

CLAIM CONSTRUCTION ORDER AND MEMORANDUM IN SUPPORT THEREOF

Before the Court are the Parties' claim construction briefs: Defendant LG Electronics, Inc.'s Opening and Reply briefs (ECF Nos. 33 and 37 respectively) and Plaintiff ParkerVision, Inc.'s Response and Sur-Reply briefs (ECF Nos. 36 and 40, respectively). United States District Judge Alan D Albright referred this case to the undersigned on April 20, 2022. ECF No. 43. The Court provided preliminary constructions for the disputed terms the day before the hearing. The Court held the *Markman* hearing on May 10, 2022. ECF No. 51. During that hearing, the Court informed the Parties of the final constructions for the disputed terms. *Id.* This Order does not alter any of those constructions.

I. BACKGROUND

Plaintiff asserts U.S. Patent Nos. 6,049,706, 6,266,518, 6,580,902, 7,110,444, 7,292,835, 8,588,725, 8,660,513, 9,118,528, 9,246,736, and 9,444,673. Plaintiff previously asserted these patents in the Western District of Texas against Intel (6-20-cv-00108, 6-20-cv-00562), Hisense (6-20-cv-00870), and TCL (6-20-cv-00945). Judge Albright held *Markman* hearings in the Intel cases

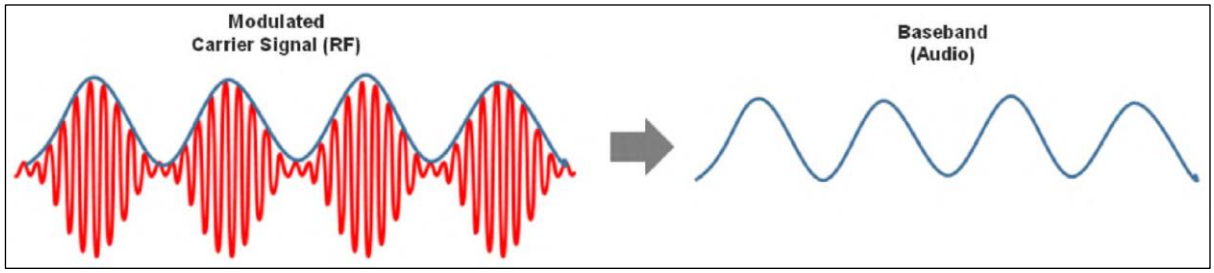
on January 26, 2021 (-00108) and July 22, 2021 (-00562). Judge Albright appointed a special master for the *Hisense* and *TCL* cases, who held the *Markman* hearing on October 27, 2021.

For 28 terms (Terms #3 to #30 below), the parties rely on the briefs from the prior Intel, Hisense, and TCL cases. ECF No. 42 (Joint Claim Construction Statement) at 3–17. The Court adopts the District Judge's and Special Master's final constructions (which were identical) for those terms.

The parties dispute the meaning of two terms which were newly briefed in this litigation.

II. DESCRIPTION OF THE ASSERTED PATENTS

The Asserted Patents describe and claim systems for down-conversion of a modulated carrier signal. '518 Patent at Abstract. Down conversion is the process of recovering the baseband (audio) signal from the carrier signal after it has been transmitted to and received by the receiver. This process is referred to as "down-conversion" because a high frequency signal is being down-converted to a low frequency signal.

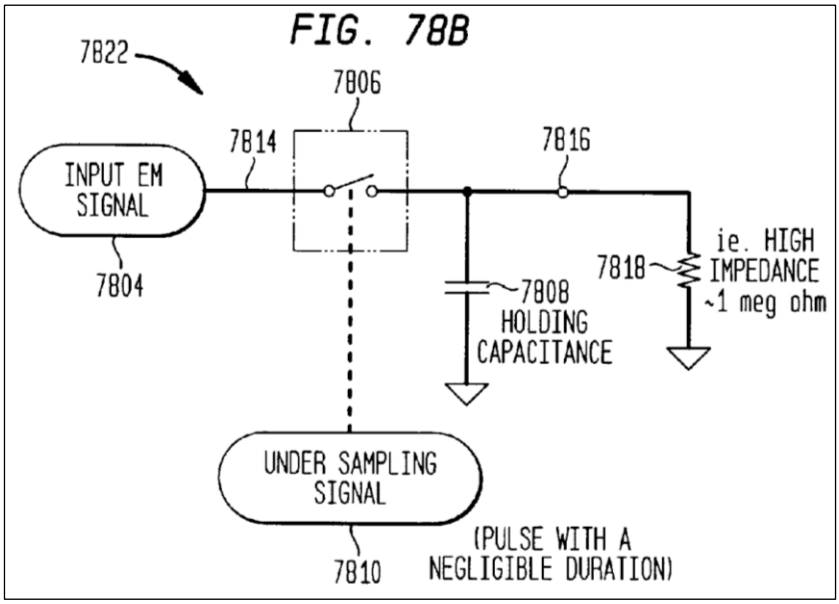


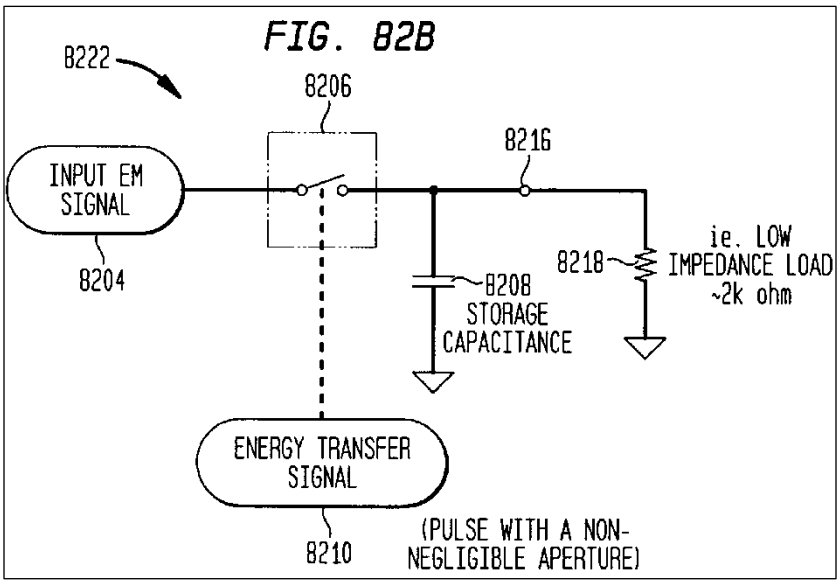
The Asserted Patents disclose at least two types of systems for down-conversion: (1) sample-and-hold (*i.e.*, voltage sampling) and (2) "energy transfer" (also known as "energy sampling"). The key difference between the two is that the former takes a small "sample" of the input signal while the latter takes a very large sample, *i.e.*, a large enough sample that a non-negligible amount of

energy is transferred from the input signal. The following sub-sections describes each type of system, their respective operation, and compares them.

A. Circuit configuration of down-sampling systems: sample-and-hold and energy transfer.

Figure 78B depicts an exemplary sample-and-hold system while Figure 82B depicts an exemplary energy transfer system. '518 Patent at 63:19–26 (sample-and-hold) and 7:63–64 (energy transfer).





While Figs. 78B and 82B depict that the respective circuits have similar structure, their respective parameter values (*e.g.*, capacitor and load impedance values)—and concomitantly their respectively operation—are very different. It is important to note that the input signal, input EM signal, is the same in both figures.

The circuits in both figures include a switching module (7806 in Fig. 78B and 8206 in Fig. 82B). *Id.* at 62:65–66 (switching module 7806), 66:13–14 (switching module 8206). The switching module opens and closes (*i.e.*, turns off and on, respectively) based on under sampling signal 7810 in Fig. 78B and energy transfer signal 8210 in Fig. 82B. *Id.* at 62:67–63:1 (under sampling signal 7810), 66:24–26 (energy transfer signal 8210). When the switching module is "closed," input EM signal 7804 and input EM signal 8204 can propagate across the switching module to holding capacitance 7808 and storage capacitance 8208, respectively, but when the switching module is "open," input EM signals 7804/8204 cannot propagate across the switching module. While both switching module 7806 and switching module 8206 open and close, the duration that each module is closed differs significantly. The specifications of the Asserted Patents describe that under sampling signal 7810 "includes a train of pulses having negligible apertures that tend towards zero time in duration." *Id.* at 63:1–3. The specification discloses an embodiment of the "negligible pulse width" as being "in the range of 1–10 p[ico]sec[onds] for under-sampling signal a 900 MHz signal." *Id.* at 63:3–5. By contrast, the specifications describe that energy transfer signal 8210 "includes a train of energy transfer pulses having <u>non-negligible</u> pulse widths that tend away from zero time in duration." *Id.* at 66:26–28 (emphasis added). The specification discloses an embodiment where the "non-negligible pulse" is approximately 550 picoseconds for a 900 MHz signal.

The specifications describe that holding capacitance 7808 and storage capacitance 8208 are capacitors that charge when switching module 7804 and switching module 8204, respectively, are closed. *Id.* at 63:10–13 (holding capacitance 7808), 66:38–42 (storage capacitance 8208). The specifications disclose that holding capacitance 7808 "preferably has a small capacitance value" and disclose an embodiment wherein holding capacitance 7808 has a value of 1 picoFarad ("pF"). *Id.* at 63:9–15. By contrast, the specifications disclose that storage capacitance 8208 "preferably has the capacity to handle the power being transferred" and disclose an embodiment wherein storage capacitance 8208 has a value "in the range of 18 pF." *Id.* at 66:38–49.

The specifications describe that holding capacitance 7808 and storage capacitance 8208 discharge through load 7812 and load 8212 when switching module 7804 and switching module 8204, respectively, are open. *See id.* at 63:19–26 (load 7812), 66:61–65 (load 8212). Fig. 78B depicts that "high impedance" load 7812 has an impedance of approximately 1 MΩ while Fig. 82B depicts that "low impedance" load 8212 has an impedance of approximately 2 KΩ. The specifications describe that "[a] high impedance load is one that is relatively insignificant to an output drive impedance of the system for a given output frequency. A low impedance load is one that is relatively significant." *Id.* at 66:58–61.

B. Operation of down-converting systems

At a very high level, both systems operate similarly. In particular, when the switching module (switching modules 7806 / 8206) is closed, the input signal (input EM signal 7804 / 8204) propagates to the capacitor (holding capacitance 7808 and storage capacitance 8208) and charge the voltage across the capacitor to the voltage of input signal. But when the switching module is open, the input signal cannot propagate to the capacitor, *i.e.*, cannot charge the voltage across the capacitor to the voltage of input signal. Rather, the charge on the capacitor discharges through the load impedance (load 7812 / 8212).

While both systems operate similarly at a high level, differences in (1) the width of the sampling aperture, (2) value of the capacitor, and (3) value of the load are what dictates whether the system operates as a sample-and-hold system or an energy transfer system.

1. Operation of sample-and-hold system

In a sample-and-hold system, the sampling aperture in under sampling signal 7810 is negligible which means only a small amount of charge from input EM signal 7804 propagates to the holding capacitance 7808 before switching module 7806 opens. *Id.* at 62:63–63:8. Because the sampling aperture has a negligible (*i.e.*, very small) width, there is only enough time take a "sample" of input EM signal 7804, *i.e.*, only a small amount of charge is transferred to holding capacitor 7808. Given that only a small amount of charge is transferred to the capacitor, the value of holding capacitor 7808 needs to be relatively low in order for the voltage across holding capacitance 7808 change to the voltage of input EM signal 7804. More specifically, the relationship between charge (Q) and voltage (V) across a capacitor (with a capacitance of C) is Q = C * V, or Q / C = V. As such, if the capacitance C is large, more charge Q is needed to order to increase the voltage to V. For example, for the same amount of charge, if the capacitance is 2C in one case and C in other case, the voltage in the former case will be half the voltage of the voltage in the latter case. *Id.* at 65:29–35. Therefore, to ensure that the value of holding capacitance 7808 does not limit the voltage across the capacitor, the value of holding capacitance 7808 needs to be, as described above, low. *Id.* at 63:9–15.

When sampling module 7806 is open, the charge on holding capacitance 7808 discharges through load impedance 7812. *See id.* at 63:19–26. When value of load impedance 7812 is high, the charge on holding capacitance 7808 discharges very slowly as compared to when the load impedance is low. More specifically, the time to discharge a capacitor is related to R * C (also known as the time constant τ) where R is the value of the load impedance. Using the exemplary

values depicted in Figs. 78B (1 MΩ) and 82B (2 KΩ), assuming that the capacitance is the same, it will take 500 times longer to discharge the capacitor with the 1 MΩ load impedance as compared to the circuit with the 2 KΩ load impedance. Because it takes significantly longer to discharge the capacitor using with a 1 MΩ load impedance (as compared to the 2 KΩ load impedance), the 1 MΩ load impedance in "holds" the charge.

To summarize, in a sample-and-hold down-sampling system, a negligible sampling aperture for switching module 7806 and a small value for holding capacitance 7808 only allows for a "sample" of the voltage of the input EM signal 7804 when switching module 7806 is closed. And because of the high value of load impedance 7812, the capacitor "holds" that value when switching module 7806 is open.

2. Operation of energy transfer system

As described above, in an energy transfer system, the sampling aperture is non-negligible (*e.g.*, 550 picoseconds versus 1 picosecond for the sample-and-hold system for a 900 MHz input signal). Therefore, there is significantly more time to transfer charge from the input signal to storage capacitance. *Id.* at 66:42–44. Because significantly more charge is transferred to the capacitor, the value of storage capacitance 8208 can be larger, in spite of the fact that charge and voltage are inversely related (*i.e.*, V = Q / C). The fact that this system transfers a large amount of charge—or energy—to the capacitor gives rise to the name "energy transfer" system.

When sampling module 8206 is open, the charge on holding capacitance 8208 discharges through load impedance 8212. *See id.* at 66:61–65. Because the load impedance in an energy transfer system is "low," *e.g.*, 2 KΩ, the charge on storage capacitance 8208 discharges much faster than the charge on a capacitor in a sample-and-hold system, *e.g.*, 500 times faster as compared to using a 1 MΩ load impedance.

To summarize, in an energy transfer down-sampling system, a non-negligible sampling aperture for switching module 8206 and a high value for holding capacitance 8208 allows for a large amount of charge—or energy—to be transferred from the input signal.

C. Comparison of sample-and-hold and energy transfer systems

The following summarizes the key difference between sample-and-hold and energy transfer systems.

Parameter	**Sample-and-hold**	**Energy transfer**
Sampling aperture	Negligible (*e.g.*, 1–10 picoseconds)	Non-negligible (*e.g.*, 550 picoseconds)
Capacitor	Holding capacitance (*e.g.*, 1 pF)	Storage capacitance (*e.g.*, 18 pF)
Load impedance	High (*e.g.*, ~1 MΩ)	Low (*e.g.*, ~2 KΩ)

It is important to emphasize that differences in the set of parameter values is what determines whether a system functions as a sample-and-hold system or an energy transfer system. For example, there is nothing special in the structure of a holding capacitance as compared to the structure of a storage capacitance. A circuit designer could, in theory, swap the holding capacitance in a sample-and-hold system with the storage capacitance in an energy transfer system and still have a sample-and-hold system by appropriately adjusting the sampling aperture and load impedance to "match" the larger capacitor value of the holding capacitance.

It is important that changing one parameter without adjusting the other parameters will prevent each system from operating as intended or have other problems. For example, using a non-negligible sampling aperture in a sample-and-hold system is unnecessary as the holding capacitance can be fully charged (to the voltage of the input signal) with a negligible aperture, but using a non-negligible sampling aperture may distort or destroy the input EM signal by transferring to much of its energy to the holding capacitance. *Id.* at 62:30–39.

Even worse, using a high load impedance in an energy transfer system or a low load impedance in a sample-and-hold system could result in a system with poor performance. *See, e.g.*, *id.* at 65:52–55. More specifically, in the latter situation, the low value of the holding capacitance combined with a low load impedance means that its corresponding time constant τ is very low, which means that the holding capacitance may discharge significantly when the switching module is open. As a result, the down-converted signal "cannot provide optimal voltage reproduction, and has relatively negligible power available at the output." *Id.* at 64:49–51.

In the former situation, the high value of the storage capacitance combined with a high load impedance means that its corresponding time constant τ is very high, which means it will take considerably more time (as compared to a low load impedance) to discharge the storage capacitance. This may result in less than optimal voltage reproduction, *e.g.*, when the voltage of the input EM signal is lower than the voltage across the capacitor. Furthermore, the down-converted signal could have substantially less power (*e.g.*: V^2/R; ~2 mV and 1 MΩ) than the energy transfer system with a low impedance load (*e.g.*: V^2/R; ~2 mV and 2 kΩ) or even the sample-and-hold system with a high impedance load (*e.g.*: V^2/R; ~5 mV and 1 MΩ). *See id.* at 67:28–33.

III. LEGAL STANDARD

A. General principles

The general rule is that claim terms are generally given their plain-and-ordinary meaning. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*); *Azure Networks, LLC v. CSR PLC*, 771 F.3d 1336, 1347 (Fed. Cir. 2014), *vacated on other grounds*, 575 U.S. 959, 959 (2015) ("There is a heavy presumption that claim terms carry their accustomed meaning in the relevant community at the relevant time.") (internal quotation omitted). The plain-and-ordinary

meaning of a term is the "meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Phillips*, 415 F.3d at 1313.

The "only two exceptions to [the] general rule" that claim terms are construed according to their plain-and-ordinary meaning are when the patentee (1) acts as his/her own lexicographer or (2) disavows the full scope of the claim term either in the specification or during prosecution. *Thorner v. Sony Computer Ent. Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012). The Federal Circuit has counseled that "[t]he standards for finding lexicography and disavowal are exacting." *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1371 (Fed. Cir. 2014). To act as his/her own lexicographer, the patentee must "clearly set forth a definition of the disputed claim term," and "'clearly express an intent' to [define] the term." *Thorner*, 669 F.3d at 1365.

"Like the specification, the prosecution history provides evidence of how the PTO and the inventor understood the patent." *Phillips*, 415 F.3d at 1317. "[D]istinguishing the claimed invention over the prior art, an applicant is indicating what a claim does not cover." *Spectrum Int'l, Inc. v. Sterilite Corp.*, 164 F.3d 1372, 1379 (Fed. Cir. 1998). The doctrine of prosecution disclaimer precludes a patentee from recapturing a specific meaning that was previously disclaimed during prosecution. *Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1323 (Fed. Cir. 2003). "[F]or prosecution disclaimer to attach, our precedent requires that the alleged disavowing actions or statements made during prosecution be both clear and unmistakable." *Id.* at 1325–26. Accordingly, when "an applicant's statements are amenable to multiple reasonable interpretations, they cannot be deemed clear and unmistakable." *3M Innovative Props. Co. v. Tredegar Corp.*, 725 F.3d 1315, 1326 (Fed. Cir. 2013).

"Although the specification may aid the court in interpreting the meaning of disputed claim language . . ., particular embodiments and examples appearing in the specification will not

generally be read into the claims." *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1571 (Fed. Cir. 1988). "[I]t is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited." *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004).

Although extrinsic evidence can be useful, it is "less significant than the intrinsic record in determining 'the legally operative meaning of claim language.'" *Phillips*, 415 F.3d at 1317 (quoting *C.R. Bard, Inc. v. United States Surgical Corp.*, 388 F.3d 858, 862 (Fed. Cir. 2004)). Technical dictionaries may be helpful, but they may also provide definitions that are too broad or not indicative of how the term is used in the patent. *Id.* at 1318. Expert testimony may also be helpful, but an expert's conclusory or unsupported assertions as to the meaning of a term are not. *Id.*

B. Whether the preamble is limiting

Courts presume that the preamble does not limit the claims. *Am. Med. Sys., Inc. v. Biolitec, Inc.*, 618 F.3d 1354, 1358 (Fed. Cir. 2010). But "[i]n general, a preamble limits the invention if it recites essential structure or steps, or if it is 'necessary to give life, meaning, and vitality' to the claim." *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (quoting *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999)). "Conversely, a preamble is not limiting 'where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention.'" *Catalina*, 289 F.3d at 808 (quoting *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997)). The Federal Circuit has provided some "guideposts" regarding whether the preamble is limiting: (1) preamble provides antecedent basis, (2) preamble is essential to understand limitations or terms in the claim

body, (3) preamble recites "additional structure or steps underscored as important by the specification," and (4) "clear reliance on the preamble during prosecution to distinguish the claimed invention from the prior art." *Catalina*, 289 F.3d at 808.

IV. LEGAL ANALYSIS

A. Term #1: "energy storage element" / "energy storage device"/ "energy storage module"/ "storage element"/ "storage module"

Term	Plaintiff's Proposed Construction	Defendant's Proposed Construction
#1: "storage module" U.S. Patent No. 6,049,706, Cls. 105, 114, 115, 164, 166, 168, 175, 179, 186, 190; U.S. Patent No. 7,292,835, Cls. 1, 18; U.S. Patent No. 8,588,725, Cls. 1, 6, 17-19 "energy storage module" U.S. Patent No. 6,580,902, Cl. 1 "storage element" U.S. Patent No. 7,110,444, Cls. 3, 4 "storage device" U.S. Patent No. 7,292,835, Cl. 20 "energy storage element" U.S. Patent No. 8,660513, Cl. 19; U.S. Patent No. 9,118,528, Cls. 1, 9; U.S. Patent No. 9,246,736, Cls. 1, 11, 21, 26, 27 "energy storage device" U.S. Patent No. 9,444,673, Cls. 13, 17, 18	**Energy storage element / storage element:** "an element of an energy transfer system that stores non-negligible amounts of energy from an input electromagnetic signal" **Energy storage module / storage module:** "a module of an energy transfer system that stores non-negligible amounts of energy from an input electromagnetic signal" **Energy storage device**: "a device of an energy transfer system that stores non-negligible amounts of energy from an input electromagnetic signal"	"a module that stores a non-negligible amount of energy from an input electromagnetic (EM) signal"

The Parties' Positions:

Despite the fact that this Court previously construed this term three other times, Defendant requests that the Court reject its previous constructions (which Plaintiff adopted as its proposed construction) and adopt Defendant's proposed construction (which the Court previously rejected). More specifically, Defendant mentions that the Patent and Trademark Appeal Board ("PTAB") rejected Plaintiff's proposed construction that limited "storage element" to "energy transfer systems" in a recent Final Written Decision. Opening at 1. Defendant contends that the Court "should follow in the PTAB's footsteps and reject ParkerVision's proposed construction." *Id.* at 2.

Defendant's central argument is that the patentees acted as their own lexicographer and expressly defined the meaning of "storage modules." *Id.* at 3. More specifically, Defendant argues that the last sentence in the following passage is a definition of this claim term:

> FIG. 82A illustrates an exemplary energy transfer system 8202 for down-converting an input EM signal 8204. The energy transfer system 8202 includes a switching module 8206 and a storage module illustrated as a storage capacitance 8208. The terms storage module and storage capacitance, as used herein, are distinguishable from the terms holding module and holding capacitance, respectively. Holding modules and holding capacitances, as used above, identify systems that store negligible amounts of energy from an under-sampled input EM signal with the intent of "holding" a voltage value. Storage modules and storage capacitances, on the other hand, refer to systems that store non-negligible amounts of energy from an input EM signal.

Opening at 3 (quoting '518 Patent at 66:11–23). Defendant contends that one indicator of intent to define this term was via the use of "refer to." Reply at 1. Defendant contends that this sentence is a complete definition. *Id.* at 2. Defendant also contends that Plaintiff previously argued for this proposed construction in a 2014 *inter partes* review ("IPR"). Opening at 4.

Defendant points out that the PTAB, despite being aware of this Court's constructions in the prior cases, recently adopted Defendant's proposed construction and implicitly rejected this Court's construction. *Id.* at 6–8. In the Final Written Decision, the PTAB wrote that adding "of an energy transfer system" is incorrect based on the patentee's purported lexicography. *Id.* at 7. Furthermore, Defendant contends that Plaintiff's proposed construction is improper because including "of an energy transfer system" implicitly includes "a low-impedance load," which the Court previously rejected including three previous times. *Id.* at 7.

In its response, Plaintiff argues that the last sentence in the above passage is not a definitional statement but, when read in context of the specification, supports Plaintiff's proposed construction. Response at 3–6. More specifically, Plaintiff contends that the specification, as a whole, describes two approaches for under-sampling: 1) energy transfer and 2) sample-and-hold. *Id.* at 3–4. Plaintiff further contends that the specification consistently describes that the "energy transfer" approach uses "storage" modules while the sample-and-hold approach uses "holding" modules. *Id.* at 4–6. Plaintiff contends that the above passage 1) describes that storage modules are used in energy transfer systems (and by implication holding modules are using in sample-and-hold systems), 2) is in the context of energy transfer systems, and 3) differentiates between storage modules and holding modules. *Id.* at 6; Sur-Reply at 3.

Plaintiff contends that the PTAB's construction is incorrect as it incorrectly construes the above highlighted sentence as a definitional statement. Response at 7. Plaintiff contends that Defendant is wrong to suggest that the Court should defer to the PTAB, especially as "the PTAB afforded no deference to this Court and expressly rejected the Court's construction," despite being aware of this Court's construction. *Id.* at 1; Sur-Reply at 5. Rather, according to Plaintiff, this Court owes no deference to the PTAB. Response at 1.

Plaintiff contends that its statement in the 2014 IPR was based on the Broadest Reasonable Interpretation ("BRI") standard that the PTAB uses and not the *Phillips* standard that Federal courts use. *Id.* at 9. Plaintiff contends it did not concede that the last sentence in the above passage was an express definition, but rather that it quoted the entire paragraph above in the IPR which indicates that Plaintiff implied that the last sentence needed to be understood in light of the paragraph as a whole. *Id*.

In its reply, Defendant contends that "on the other hand" in the above passage indicates that the patentee was contrasting storage and holding modules, and not energy transfer and sample-and-hold systems. Reply at 3. Defendant further contends that BRI is irrelevant because lexicography is the same under BRI or *Phillips*. Reply at 4.

In its sur-reply, Plaintiff contends that Defendant ignores that the specification describes that energy transfer systems use storage modules. Sur-Reply at 1, 3. Plaintiff contends that even though Defendant alleges lexicography, Defendant's proposed construction does not adopt that alleged express definition, but rather modifies it in a few minor ways. *Id.* at 3. Plaintiff also contends that when the patentee wanted to define something, it did so in the "General Terminology" section, which further indicates that the last sentence in the above passage is not an express definition. *Id.* Plaintiff contends that "on the other hand" in the above passage simply distinguishes "storage" and "holding" modules, and is not a definition. *Id.* at 5. Plaintiff contends that Defendant does not consider the specification as a whole and construes the term in a manner that renders the patent internally consistent. *Id.* Plaintiff finally contends that its statements in the 2014 IPR are extrinsic evidence. *Id.*

The Court's Analysis:

After reviewing the parties' arguments and considering the applicable law, the Court declines to adopt Defendant's proposed construction and instead will adopt its final construction from the prior *ParkerVision* cases as the final construction in this case.

To act as their own lexicographer, the patentees must "clearly set forth a definition of the disputed claim term," and "'clearly express an intent' to [define] the term." *Thorner*, 669 F.3d at 1365. The Court does not find that Defendant has shown that both elements are met here for at least the following reasons.

First, the Court does not believe that—even in isolation—that the last sentence rises to the "exacting standards" necessary for lexicography. *Hill-Rom Servs.*, 755 F.3d at 1371. For the reasons described in Section II, a POSITA would understand that a "storage capacitance" is just a generic capacitor (as is a holding capacitance); a POSITA would not understand that a storage (or holding) capacitance is a special or particular type of capacitor with unique features or functionality, *e.g.*, a capacitor that only stores or is only capable of storing "a non-negligible amount of energy from an input electromagnetic (EM) signal." In addition, the last sentence's use of the phrase "on the other hand" indicates that it is making a comparison and, as such, a POSITA would not only look to this sentence in isolation—or even this passage alone—to understand the meaning the of "storage module" or "storage capacitance." Similarly, based on the words "refers to," a POSITA would not only look to this sentence to understand the meaning of those terms. Finally, a POSITA would not understand that "storage capacitance" is a "system," or otherwise equate them. Rather, a POSITA would understand that "storage capacitance" is a component of a system. As such, a POSITA would likely understand that the storage capacitance's place and role in an electrical system—and not any inherent property of the storage capacitance itself—is why

the storage capacitance only stores a non-negligible amount of energy from an input EM signal. Therefore, based on last sentence in isolation, the Court does not find that the patentees "clearly set forth a definition" nor did they "clearly express an intent' to [define] the term." *Thorner*, 669 F.3d at 1365.

Second, the passage as a whole ('518 Patent at 66:11–23) supports the Court's conclusion that the last sentence does not rise to the level of a lexicographical statement. This passage, when read in context, describes the operation of a capacitor in an energy transfer system (*i.e.*, the "storage capacitance" and "storage module") as compared to the operation of the corresponding capacitor in a sample-and-hold system (*i.e.*, the "holding capacitance" and "holding module"). For example, the passage initially recites that the "storage module" and "storage capacitance" are components of an energy transfer system. The passage then recites "[t]he terms storage module and storage capacitance, as used herein, are distinguishable from the terms holding module and holding capacitance, respectively." Based on these two sentences, a POSITA would understand that the remainder of the passage will compare a storage module / capacitance, which this passage describes as a component of an energy transfer system, with a holding module / capacitance (which was previously described as a component of a sample-and-hold system). Furthermore, this passage describes that "[h]olding modules and holding capacitances, as used above, identify systems[.]" The Court finds that a POSITA would understand this snippet as describing that one can identify whether a system is an energy transfer system or a sample-and-hold system based on how the capacitor operates within the system and/or its size (for a given input EM signal, sampling aperture, and load impedance). For example, as described above, by using a negligible sampling aperture and high load impedance, a capacitor with a low capacitance value functions as a holding

capacitance. By contrast, by using a non-negligible sampling aperture and low load impedance, a capacitor with a high capacitance value functions as a storage capacitance.

Third, the specification as a whole provides definitive confirmation that the patentees did not intend for the last sentence to be a lexicographical statement. For example, this passage appears within a sub-section entitled "0.1.2 Introduction to Energy Transfer." '518 Patent at 65:56. The previous sub-section is entitled "0.1.1 Review of Undersampling." *Id.* at 62:62. Both of these sub-sections are within a section entitled "0.1 Energy Transfer Compared to Under-Sampling." Therefore, based on the organization of the sub-sections, a POSITA would understand that this passage will compare a storage module / capacitance in the context of an energy transfer system with a holding module / capacitance in the context of a sample-and-hold system, and not that the passage is specifically defining that a storage module /capacitance is a generic capacitor that is capable of holding a non-negligible amount of charge. These comparisons further confirm the Court's conclusion that the passage as a whole compares the capacitance in energy transfer and sample-and-hold systems. At minimum, this comparison casts serious doubt as to whether the patentees "'clearly express an intent' to [define] the term." *Thorner*, 669 F.3d at 1365.

Furthermore, the specification and figures repeatedly compare and contrast energy transfer systems with sample-and-hold systems. *See, e.g.*, '518 Patent at 62:17–21 ("Fundamental descriptions of how [energy transfer] is accomplished is presented step by step beginning with a comparison with an under-sampling system."); Figs. 45A and 45B (depicting a conceptual illustration of aliasing including under-sampling and energy transfer according to embodiments of the invention); *compare id.* at 62:23–65:55 ("0.1.1 Review of Undersampling") *with id.* at 66:56–67:39 ("0.1.2 Introduction to Energy Transfer"); *id.* at 19:43–20:51 ("2.2 Down-Converting by Under-Sampling") *with id.* at 20:53–22:4 ("2.3 Down-Converting by Transferring Energy"). The

specification even compares corresponding components in the sample-and-hold and energy transfer systems. *See, e.g., id.* at 65:59–62 ("Unlike under-sampling signals that have negligible aperture pulses, the energy transfer signal includes a train of pulses having non-negligible apertures that tend away from zero."). Furthermore, the specification compares the output power of sample-and-hold and energy transfer systems. *See, e.g., id.* at 68:25–37. Based on all these comparisons, a POSITA would understand that the last sentence in the above passage is directed towards a comparison of the capacitance in an energy transfer as compared to the capacitance in a sample-and-hold system.

Based on the above reasons, the Court concludes that the patentees did not "clearly express an intent' to [define] the term" in the last sentence of the passage of the '518 Patent at 66:11–23. *Thorner,* 669 F.3d at 1365. Rather, this sentence, in light of the specification, merely contrasts the operation of the capacitor in an energy transfer system with the capacitor in a sample-and-hold system. Therefore, because Defendant has neither shown that the patentees "clearly set forth a definition of the disputed claim term" nor that the patentees had "clearly express[ed] an intent to [define] the term," the Court concludes that patentees did not act as their own lexicographer. *Id.*

Finally, with respect to Defendant's argument that the Court "should follow in the PTAB's footsteps and reject ParkerVision's proposed construction," the Court disagrees. Opening at 2. For the reasons discussed herein, the Court concludes that the PTAB incorrectly put too much weight and focus on the alleged definitional sentence while also incorrectly ignoring teachings found throughout the specification. Accordingly, the Court declines to defer to the PTAB.

B. Term #2: Whether "cable modem" is limiting

Term	Plaintiff's Proposed Construction	Defendant's Proposed Construction
#2: "A cable modem for down-converting an electromagnetic signal having complex modulations, comprising" U.S. Patent No. 7,292,835 Patent, Cl. 1	The entire preamble (including "cable modem") is limiting.	Only the portion of the preamble reciting "an electromagnetic signal having complex modulations" is limiting.

The Parties' Positions:

The preamble of Claim 1 provides:

> 1. A cable modem for down-converting an electromagnetic signal having complex modulations, comprising

The parties dispute whether "cable modem" in the preamble is limiting. Defendant contends that only the portion of the preamble reciting "an electromagnetic signal having complex modulations" is limiting.[1] Opening at 8. Plaintiff argues that the entire preamble—including "cable modem"—is limiting. Response at 15.

Defendant makes several arguments in support of its proposed construction. First, Defendant points out that Plaintiff did not previously assert that "cable modem" was limiting in recent *Markman* proceedings before this Court and argues that Plaintiff only does so now to bolster its validity positions. Opening at 10; *see, e.g., ParkerVision, Inc. v. Hisense Co., Ltd.*, No. 6:20-cv-00870, ECF No. 51 (W.D. Tex. Oct. 29, 2021). Second, Defendant points out that the preamble's recitation of "cable modem" does not provide antecedent basis. Opening at 10. Third, Defendant contends that "cable modem" is only an intended use and that the specification describes that the invention is not limited to cable modem embodiments. Opening at 11 (citing '835 Patent

[1] Neither party contests, and this Court agrees, that the term "an electromagnetic signal having complex modulations" is limiting. Opening at 17–18; Response at 14–15.

at 50:14–15); Reply at 7 (contending that the summary of the invention does not mention cable modems). Fourth, Defendant contends that the claim defines a structurally complete invention and that the term does not "give life, meaning, and vitality to the claim," in that if it were removed, the claim would still define a structurally complete invention. Opening at 11 (quoting *Catalina*, 289 F.3d at 808).

With respect to Defendant's first argument, Plaintiff does not appear to deny the substance of Defendant's argument. *See, e.g.*, Response at 9–12.

With respect to Defendant's argument that this term does not provide antecedent basis, Plaintiff contends that "cable modem" in the preamble of Claim 1 provides antecedent basis for "the cable modem" which appears in the preambles of dependent Claims 16 and 17. Sur-Reply at 6.

With respect to Defendant's argument that Plaintiff's proposed construction improperly limits the term's scope of a disclosed embodiment, Plaintiff contends argues that the cable modem is not merely one embodiment, but rather that it "*is* the invention." Response at 12 (emphasis in original). Plaintiff contends that "cable modem" is not an intended use. *Id.* at 12. Plaintiff further contends that a claim does not need to cover every embodiment. Sur-Reply at 7.

With respect to Defendant's argument that the claim body recites a complete invention, Plaintiff makes at least three counterarguments. First, Plaintiff contends that the claims reflect that the specification differentiates between cable modems and data modems. Response at 10 (citing '835 Patent at 36:18–25. Second, Plaintiff contends that "cable modem" recites additional structure. More specifically, Plaintiff contends that a modem is a device that modulates and demodulates and that "the claims are directed towards a configuration of the receiver that, *e.g.*, can operate along with a transmitter so that there is no interference between the receiver and

transmitter." Response at 11. Plaintiff further contends that "cable modem" describes a fundamental characteristic of the claimed invention because it informs the meaning of the "frequency down-conversion module" and "electromagnetic signal." Sur-Reply at 7. Third, Plaintiff contends that cable modems are one type of system or device that "down-converts an electromagnetic signal having complex modulations" (*e.g.*, QAM or QSK) as such it is essential structure. Response at 11–12.

Finally, Plaintiff contends that the originally filed claims used the word "system," which the applicant narrowed to 'cable modem.'" *Id.* at 12. Based on this change, Plaintiff contends that "the applicants expressly narrowed the scope of the claims to a cable modem system having those elements." *Id.*

With respect to Plaintiff's last argument, Defendant contends that this does not meet the standard necessary to find the preamble limiting (no "clear reliance on the preamble during prosecution to distinguish prior art"). Reply at 6. Rather, Defendant contends that the applicant just made this amendment without any explanation. *Id.* at 6–7.

With respect to Plaintiff's arguments that the claim body does not recite a complete invention, Defendant makes several points. First, Defendant contends that "generalized background information about 'modems,' 'data modems,' and 'cable modems' does not mean that 'cable modem' is an essential structure or is otherwise underscored as important" and that nothing in these generalized discussions remotely suggests that 'cable modem' is essential or important to the claimed invention. *Id.* at 5. Second, Defendant contends that the patent does not define what "complex modulation" is, so it is incorrect to assume that only a cable modem is capable of doing that. *Id.* at 6.

The Court's Analysis:

After reviewing the parties' arguments and considering the applicable law, the Court agrees with Defendant that "cable modem" in the preamble is not limiting for at least the following reasons. ***First***, the presumption is that the preamble is not limiting and that Plaintiff's arguments do not overcome this presumption. *Am. Med. Sys.*, 618 F.3d at 1358. ***Second***, the fact that Plaintiff did not assert that this term was limiting in prior cases also indicates that Plaintiff, at least at one point in time, did not consider this term to be limiting.

Third, the Court finds that the body of Claim 1 recites a complete invention. The Court does not agree with Plaintiff that "cable modem" recites additional structure, but rather finds that the passages Plaintiff cites from the specification are merely generalized background information and that these passages does not suggest that 'cable modem' is essential or important. In other words, if "cable modem" was replaced with a generic term like "device" or "system," Claim 1 would still define a structurally complete invention that down-converts an electromagnetic signal by using an oscillator, a phase shifter, a first frequency down-conversion module, and a second frequency down-conversion module.

Fourth, the Court finds that Plaintiff's proposed construction incorrectly limits the claim scope to a particular embodiment. *Comark Commc'ns, Inc. v. Harris Corp.*, 156 F.3d 1182, 1187 (Fed. Cir. 1998) ("Although the specification may aid the court in interpreting the meaning of disputed claim language, particular embodiments and examples appearing in the specification will not generally be read into the claims."). The patent's specification discloses several "exemplary application embodiments" of the claimed invention, of which "cable modem" is only one. '835 Patent at 5:11–59. The patent further states that these embodiments are "for purpose of illustration" and are "not intended to limit the invention." *Id.* at 50:13-15. Plaintiff has not pointed

to any "clear indication in the intrinsic record that the patentee intended the claims to be so limited." *Liebel-Flarsheim*, 358 F.3d at 913.

Fifth, the Court finds although Applicant changed "system" to "cable modem," Applicant did not provide a reason for making this change, let alone that Applicant expressly narrowed the scope of the claims to a cable modem system having those elements. This lack of disclosure falls well-short of the "clear reliance on the preamble during prosecution to distinguish the claimed invention from the prior art" necessary to limit find this term limiting. *Catalina*, 289 F.3d at 808.

Finally, the Court disagrees with Plaintiff that the preamble of Claim 1 provides antecedent basis for "the cable modem" which appears in the preambles of dependent Claims 16 and 17. In particular, a dependent claim is a distinct claim that includes the limitations of the independent claim. As such, dependent Claims 16 and 17 could be rewritten into independent form by reciting Claim 1's limitations and including the dependent claim's limitation. Plaintiff does not cite any authority where a court found that the recitation of a claim term in the body of a dependent claim requiring limiting that claim term in the preamble of the independent claim. At most, in such a situation only the preamble of the dependent claim would be so limited.

Therefore, for the reasons above, the Court finds that "cable modem" in the preamble of Claim 1 is not limiting but the rest of Claim 1's preamble ("an electromagnetic signal having complex modulations") is limiting.

V. CONCLUSION

In conclusion, for the reasons described herein, the Court adopts the below constructions as its final constructions.

SIGNED this 21st day of June, 2022.

DEREK T. GILLILAND
UNITED STATES MAGISTRATE JUDGE

Term	Plaintiff's Proposed Construction	Defendant's Proposed Construction	Court's Final Construction

#1: "storage module" U.S. Patent No. 6,049,706, Cls. 105, 114, 115, 164, 166, 168, 175, 179, 186, 190; U.S. Patent No. 7,292,835, Cls. 1, 18; U.S. Patent No. 8,588,725, Cls. 1, 6, 17-19 "energy storage module" U.S. Patent No. 6,580,902, Cl. 1 "storage element" U.S. Patent No. 7,110,444, Cls. 3, 4 "storage device" U.S. Patent No. 7,292,835, Cl. 20 "energy storage element" U.S. Patent No. 8,660513, Cl. 19; U.S. Patent No. 9,118,528, Cls. 1, 9; U.S. Patent No. 9,246,736, Cls. 1, 11, 21, 26, 27 "energy storage device" U.S. Patent No. 9,444,673, Cls. 13, 17, 18	**Energy storage element / storage element:** "an element of an energy transfer system that stores non-negligible amounts of energy from an input electromagnetic signal" **Energy storage module / storage module:** "a module of an energy transfer system that stores non-negligible amounts of energy from an input electromagnetic signal" **Energy storage device**: "a device of an energy transfer system that stores non-negligible amounts of energy from an input electromagnetic signal"	"a module that stores a non-negligible amount of energy from an input electromagnetic (EM) signal"	"a [device / module / element] of an energy transfer system that stores non-negligible amounts of energy from an input electromagnetic signal"

#2: "A cable modem for down-converting an electromagnetic signal having complex modulations, comprising" U.S. Patent No. 7,292,835 Patent, Cl. 1	The entire preamble (including "cable modem") is limiting.	Only the portion of the preamble reciting "an electromagnetic signal having complex modulations" is limiting.	Only the portion of the preamble reciting "an electromagnetic signal having complex modulations" is limiting.
#3: "said input sample", "said sample" U.S. Patent No. 6,049,706, Cls. 1, 6, 7, 34	Plain and ordinary meaning	"the sample of the image that has been down-converted"	Plain-and-ordinary meaning
#4: "under-sample" / "undersamples" / "under-sampling" U.S. Patent No. 6,049,706, Cls. 1, 6; 7, 28, 34; U.S. Patent No. 7,110,444, Claim 2	"sampling at an aliasing rate" or "sampling at less than or equal to twice the frequency of the input signal"	"sampling at less than or equal to twice the frequency of the input signal"	"sampling at an aliasing rate" or "sampling at less than or equal to twice the frequency of the input signal"

#5: "harmonic" / "harmonics" U.S. Patent No. 6,049,706, Cls. 1, 6, 7, 28, 34; U.S. Patent No. 6,266,518, Cl. 1	**Harmonic:** "A sinusoidal component of a periodic wave that has a frequency that is an integer multiple of the fundamental frequency of the periodic waveform and including the fundamental frequency as the first harmonic" **Harmonics:** "A frequency or tone that, when compared to its fundamental or reference frequency or tone, is an integer multiple of it and including the fundamental frequency as the first harmonic"	**Harmonic:** "A sinusoidal component of a periodic wave that has a frequency that is an integer multiple of the fundamental frequency of the periodic wave" **Harmonics:** "Sinusoidal components of a periodic wave each of which have a frequency that is an integer multiple of the fundamental frequency of the periodic wave"	Plain-and-ordinary meanings: • **Harmonic**: "A sinusoidal component of a periodic wave that has a frequency that is an integer multiple of the fundamental frequency of the periodic waveform and including the fundamental frequency as the first harmonic" • **Harmonics**: "A frequency or tone that, when compared to its fundamental or reference frequency or tone, is an integer multiple of it and including the fundamental frequency as the first harmonic"
#6: "integral filter/frequency translator to filter and down-convert an input signal" U.S. Patent No. 6,049,706, Cl. 28	Plain and ordinary meaning wherein the plain-and-ordinary meaning is "a circuit having a unified input filter and frequency translator."	Plain and ordinary meaning	Plain-and-ordinary meaning wherein the plain-and-ordinary meaning is "a circuit having a unified input filter and frequency translator."

#7: "modulated signal" U.S. Patent No. 6,049,706, Cl. 127 "modulated carrier signal" U.S. Patent No. 8,660,513, Cl. 19; U.S. Patent No. 9,118,528, Cls. 1, 5, 14; U.S. Patent No. 9,246,736, Cls. 1, 11, 15; U.S. Patent No. 9,444,673, Cls. 1, 2, 7, 13, 19	"an electromagnetic signal at a transmission frequency having at least one characteristic that has been modulated by a baseband signal"	Plain and ordinary meaning	Plain-and-ordinary meaning wherein the plain-and-ordinary meaning is "an electromagnetic signal at a transmission frequency having at least one characteristic that has been modulated by a baseband signal"

#8: "switch" U.S. Patent No. 6,049,706, Cls. 105, 107, 109, 111, 114, 115, 164, 165, 166, 168, 175, 176, 179, 186, 187, 190; U.S. Patent No. 6,266,518, Cl. 50; U.S. Patent No. 7,110,444, Cl. 3; U.S. Patent No. 7,292,835, Cls. 18, 19, 20; U.S. Patent No. 8,660,513, Cl. 19; U.S. Patent No. 9,118,528, Cls. 1, 5, 8, 17; U.S. Patent No. 9,246,736, Cls. 1, 11, 15, 21, 26, 27; U.S. Patent No. 9,444,673, Cls. 1, 6, 7, 13, 17, 18) "switch module" U.S. Patent No. 6,580,902, Cl. 1 "switching device" U.S. Patent No. 8,588,725, Cl. 1	Plain-and-ordinary meaning wherein the plain-and-ordinary meaning is "an electronic device for opening and closing a circuit as dictated by an independent control input"	Plain and ordinary meaning	Plain-and-ordinary meaning wherein the plain-and-ordinary meaning is "an electronic device for opening and closing a circuit as dictated by an independent control input"
#9: "universal frequency down-converter (UFD)" U.S. Patent No. 6,266,518, Cl. 50	"circuitry that generates a down converted output signal from an input signal from a wide range of electromagnetic frequencies"	Plain and ordinary meaning	"circuitry that generates a down converted output signal from an input signal from a wide range of electromagnetic frequencies"

#10: "a down-converted signal being generated from said sampled energy" U.S. Patent No. 6,580,902, Cl. 1	"a lower frequency signal formed from sampled energy transferred from the electromagnetic signal when the switch module is closed and from sampled energy discharged from the storage module when the switch module is open"	"a down-converted signal being created from sampled energy stored in the energy storage module"	"a lower frequency signal formed from sampled energy transferred from the electromagnetic signal when the switch module is closed and from sampled energy discharged from the storage module when the switch module is open"
#11: "frequency down-conversion module" U.S. Patent No. 7,110,444, Cl. 2, 3; U.S. Patent No. 9,444,673, Cl. 1	Not subject to § 112, ¶ 6 Plain and ordinary meaning	Subject to § 112, ¶ 6. **Function**: "to down-convert the input signal ... according to a [] control signal and output[] a [] down-converted signal." **Structure**: an "aliasing module 2000" (blue) comprising at least one switch and one capacitor (Figures 20A and 20A-1).	Not subject to § 112, ¶ 6. Plain-and-ordinary meaning.

#12: "system for frequency down-converting" U.S. Patent No. 8,660,513, Cl. 19; U.S. Patent No. 9,118,528, Cl. 1; U.S. Patent No. 9,246,736, Cl. 1 "apparatus for down-converting" U.S. Patent No. 9,444,673, Cl. 13	Plain and ordinary meaning	"A system that down-converts a modulated carrier signal at an aliasing rate (i.e., by sampling at less than or equal to twice the frequency of the modulated carrier signal)"	Preamble is limiting. Plain-and-ordinary meaning.
#13: [wherein said storage elements comprises] "a capacitor that reduces a DC offset voltage in said first down-converted signal and said second down-converted signal" U.S. Patent No. 7,110,444, Cl. 4	Plain and ordinary meaning wherein the "a capacitor" in each of the storage elements reduces a DC offset voltage in the corresponding down-converted signal	[wherein said storage elements comprises] "a capacitor that reduces a DC offset voltage in both said first down-converted signal and said second down-converted signal"	Plain-and-ordinary meaning wherein the "a capacitor" in each of the storage elements reduces a DC offset voltage in the corresponding down-converted signal
#14: "DC offset voltage" U.S. Patent No. 7,110,444, Cl. 4	Plain and ordinary meaning wherein the plain-and-ordinary meaning is "the difference between the DC voltage of a signal and a reference voltage, *e.g.*, ground"	Plain and ordinary meaning	Plain-and-ordinary meaning wherein the plain-and-ordinary meaning is "the difference between the DC voltage of a signal and a reference voltage, *e.g.*, ground"

#15: "sampling aperture" U.S. Patent No. 8,660,513, Cl. 19; U.S. Patent No. 9,118,528, Cl. 1; U.S. Patent No. 9,246,736, Cls. 1, 11; U.S. Patent No. 9,444,673, Cls. 13, 17, 19	"a period of time during which the switch is in its closed (i.e., on) state"	"a period of time during which the switch is in its closed (*i.e.*, on) state as part of the process of reducing a continuous-time signal to a discrete-time signal"	"a period of time during which the switch is in its closed (*i.e.*, on) state"
#16: "means for under-sampling an input signal to produce an input sample of a down-converted image of said input signal" U.S. Patent No. 6,049,706, Cl. 6	Subject to § 112, ¶ 6. **Function**: under-sampling an input signal to produce an input sample of a down-converted image of the input signal and under-sampling the input signal according to a control signal **Structure**: switch 2650 in Fig. 26; switch 5308 in Figs. 53A/53A-1; and equivalents thereof	Subject to § 112, ¶ 6. **Function**: "under-sampling an input signal to produce an input sample of a down-converted image of said input signal and under-sampling the input signal according to a control signal" **Structure**: "the switch 2650 and the capacitor 2652 in Fig. 26; the switch 5308 and capacitor 5310 in Figs. 53A/53A-1, and equivalents thereof"	Subject to § 112, ¶ 6. **Function**: under-sampling an input signal to produce an input sample of a down-converted image of said input signal and under-sampling the input signal according to a control signal **Structure**: the switch 2650 and the capacitor 2652 in Fig. 26 the switch 5308 and capacitor 5310 in Figs. 53A/53A-1, and equivalents thereof.

#17: "first delaying means for delaying said input sample" U.S. Patent No. 6,049,706, Cl. 6	Subject to § 112, ¶ 6. **Function**: delaying the input sample of a down-converted image of said input signal **Structure**: capacitor 2656 in Fig. 26 or capacitor 5310 in Figs. 53A/53A1; and equivalents thereof	Subject to § 112, ¶ 6. **Function**: "delaying said input sample" **Structure**: "switch 2654 and capacitor 2656 shown in Fig. 26"	Subject to § 112, ¶ 6. **Function**: delaying said input sample **Structure**: switch 2654 and capacitor 2656 shown in Fig. 26.
#18: "second delaying means for delaying instances of an output signal" U.S. Patent No. 6,049,706, Cl. 6	Subject to § 112, ¶ 6. **Function:** delaying instances of an output signal **Structure:** delay modules 1722A, 1722B, 1722C, etc. in FIG. 17; delay modules 1912, 1914 in Fig. 19; delay modules 2316, 2318 in Fig. 23; first delay module 2628, second delay module 2630 in Fig. 26; delay module 3204 shown in Fig. 32; sample and hold circuits 4501, 4503 shown in Fig. 45; analog delay line 3404 shown in Fig. 34 having a combination of capacitors, inductors, and/or resistors; and equivalents thereof	Subject to § 112, ¶ 6. **Function:** delaying instances of an output signal **Structure:** structure including "first delay module 2628," "second delay module 2630" shown in Fig 26 and described at 32:27-55, "delay module 3204" shown in Fig. 32 and described at 35:1-18; the sample and hold circuits 4501 and 4503 in Fig. 45 and described at 32:44-64; or an analog delay line having a combination of capacitors, inductors and/or resistors described at 35:19-27; and equivalents thereof.	Subject to § 112, ¶ 6. **Function**: delaying instances of an output signal **Structure**: delay modules 1722A, 1722B, 1722C, etc. in FIG. 17; delay modules 1912, 1914 in Fig. 19; delay modules 2316, 2318 in Fig. 23; first delay module 2628, second delay module 2630 in Fig. 26; delay module 3204 shown in Fig. 32; sample and hold circuits 4501, 4503 shown in Fig. 45; analog delay line 3404 shown in Fig. 34 having a combination of capacitors, inductors, and/or resistors; and equivalents thereof

#19: "filter tuning means for tuning one or more filter parameters" U.S. Patent No. 6,049,706, Cl. 134	Subject to § 112, ¶ 6. **Function:** tuning one or more filter parameters **Structure**: scaling modules 1716A, 1716B, 1716C, 1724A, 1724B, 1724C in Fig. 17; control signal generator 1790 in Fig. 17; input scaling module 1909 in Fig. 19; scaling modules 1916, 1918 in Fig. 19; scaling modules 2312, 2320, 2322 in Fig. 23; scaling module 2632, 2634 in Fig. 26; scaling module 3502 including resistor attenuator 3504, 3602 in Figs. 35, 36; scaling module 3702 including amplifier/attenuator 3704 in Fig. 37; control signal generator 4202 in Fig. 42; and equivalents thereof	Subject to § 112, ¶ 6. **Function:** tuning one or more filter parameters **Structure:** scaling modules including the resistor attenuator 3602 (shown in Fig. 36 and described at 35:44-55) or the amplifier/attenuator 3704 implemented using operational amplifiers, transistors, or FETS (shown in Fig. 37 and described at 35:60-67), each of the resistor attenuator 3602 and the amplifier/attenuator 3704 having tunable resistors, capacitors, or inductors (as described at 42:33-36); and equivalents thereof; **OR** the control signal generator 4202 (shown in Fig. 42 and described at 36:44-62 and 42:27-32) implemented with a tunable oscillator 4204 and an aperture optimizing module 4210 using tunable components (such as tunable resistors, capacitors, inductors, etc.) (described at 36:63-37:5 and 42:2732) and equivalents thereof.	Subject to § 112, ¶ 6. **Function**: tuning one or more filter parameters **Structure**: scaling modules 1716A, 1716B, 1716C, 1724A, 1724B, 1724C in Fig. 17; input scaling module 1909 in Fig. 19; scaling modules 1916, 1918 in Fig. 19; scaling modules 2312, 2320, 2322 in Fig. 23; scaling module 2632, 2634 in Fig. 26; scaling module 3502 including resistor attenuator 3504, 3602 in Figs. 35, 36; scaling module 3702 including amplifier/attenuator 3704 in Fig. 37; and equivalents thereof.

#20: "a frequency translator to produce a sample of a down-converted image of an input signal, and to delay said sample" U.S. Patent No. 6,049,706, Cl. 34	Not subject to 35 U.S.C. § 112, ¶ 6. Plain and ordinary meaning	Subject to 35 U.S.C. § 112, ¶ 6. **Function**: "produce a sample of a down-converted image of an input signal according to a control signal, and delay said sample" **Structure**: "the down-convert and delay module 2624 in Fig. 26 and described at 26:1-27:21 and 28:20-41, that includes the switches 2650 and 2654, and the capacitors 2652 and 2656; and equivalents thereof"	Not subject to § 112, ¶ 6. Plain-and-ordinary meaning.

#21: "a down-convert and delay module to under-sample an input signal to produce an input sample of a down-converted image of said input signal, and to delay said input sample" U.S. Patent No. 6,049,706, Cls. 1, 7	Not subject to § 112, ¶ 6 Plain and ordinary meaning	Subject to § 112, ¶ 6. **Function**: "under-sample an input signal according to a control signal to produce an input sample of a down-converted image of said input signal, and to delay said input sample" **Structure**: "the down convert and delay module 2624 in Fig. 26 and described at 26:1-27:21 and 28:2041, that includes the switches 2650 and 2654, and the capacitors 2652 and 2656; and equivalents thereof"	Not subject to § 112, ¶ 6. Plain and ordinary meaning

#22: "at least one delay module to delay instances of an output signal" U.S. Patent No. 6,049,706, Cls. 1, 7 "at least one delay module to delay an output signal" U.S. Patent No. 6,049,706, Cls. 34	Not subject to § 112, ¶ 6 Plain and ordinary meaning	Subject to § 112, ¶ 6. **Function:** delay instances of an output signal / further delay one or more of said delayed and downconverted input samples **Structure:** structure including "first delay module 2628," "second delay module 2630" shown in Fig 26, "delay module 3204" shown in Fig. 32 and described at 35:1-18; the sample and hold circuit 4501 and 4503 in Fig. 45 and described at 32:44-33:19; or an analog delay line having a combination of capacitors, inductors and/or resistors described at 35:19-27; or equivalents thereof.	Not subject to § 112, ¶ 6. Plain-and-ordinary meaning.
#23: "said control signal comprises a train of pulses having pulse widths that are established to improve energy transfer from said input signal to said down-converted image" U.S. Patent No. 6,049,706, Cl. 2	Plain and ordinary meaning	Indefinite	Not indefinite. Plain-and-ordinary meaning.

#24: "said energy transfer signal generator establishes apertures of said pulses to increase the time that said switch is closed for a purpose of reducing an impedance of said switch" U.S. Patent No. 6,049,706, Cl. 107 "said energy transfer signal generator establishing apertures of said pulses to increase the time that said switch is closed to reduce an impedance of said switch, and to increase energy transferred from said input signal" U.S. Patent No. 6,049,706, Cls. 165, 176, 187	Plain and ordinary meaning	Indefinite	Not indefinite. Plain-and-ordinary meaning.

#25: "between six and fifty percent of the energy transferred from the RF information signal to the storage module is discharged from the storage module" U.S. Patent No. 8,588,725, Cl. 17 "between six and twenty-five percent of the energy transferred from the RF information signal to the storage module when is discharged from the storage module." U.S. Patent No. 8,588,725, Cl. 18 "between ten and twenty percent of the energy transferred from the RF information signal to the storage module discharged from the storage module" U.S. Patent No. 8,588,725, Cl. 19 "the energy discharged during any given discharge cycle is not completely discharged"	Plain and ordinary meaning	Indefinite	Not indefinite. Plain-and-ordinary meaning.

U.S. Patent No. 9,118,528, Cl. 9; U.S. Patent No. 9,246,736, Cls. 1, 11			
#26: "low impedance load" U.S. Patent No. 9,246,736, Cls. 26, 27; U.S. Patent No. 9,444,673, Cls. 5, 17 "said enemy[sic] discharged from said capacitor provides sufficient power to drive the low impedance load." U.S. Patent No. 9,444,673, Cl 5	Plain and ordinary meaning	Indefinite	Not indefinite. Plain and ordinary meaning.

#27: "wherein said energy transfer signal generator in widening said apertures of said pulses by a non-negligible amount that tends away from zero time in duration to extend the time that said switch is closed for the purpose of increasing energy transferred from said input signal does so at the expense of reproducing said input signal, such that said increased energy transferred from said input signal when said switch is closed in response to said energy transfer signal prevents substantial voltage reproduction of said input signal" U.S. Patent No. 6,049,706, Cl. 111	Plain and ordinary meaning	Indefinite	Not indefinite. Plain-and-ordinary meaning.
#28: "substantially the same size" U.S. Patent No. 6,580,902, Cl. 5	Plain and ordinary meaning	Indefinite	Not indefinite. Plain-and-ordinary meaning.

#29: "separate integration module" U.S. Patent No. 9,118,528, Cl. 17	Plain and ordinary meaning	Indefinite	Not indefinite. Plain-and-ordinary meaning.
#30: "voltage of the input modulated carrier signal is not reproduced or approximated at the capacitor during the apertures or outside of the apertures" U.S. Patent No. 9,444,673, Cl. 2	Plain and ordinary meaning	Indefinite	Not indefinite. Plain-and-ordinary meaning.